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A Summary of the Sucking Lice (Anoplura).

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For the reception of the 200 known species a total of 57 generic and subgeneric names has been proposed. Of these, one is invalidated by preoccupation and two by community of type with other Anopluran genera, thus leaving 54 names that are nomenclatorially valid. Of these—as an expression of purely personal opinion—the writer rejects 20, thus leaving 34 which in his view represents groups that are worthy of recognition in the present state of our knowledge. All of these rejected generic names are available for use, however, and some of them may possibly be employed by future workers.

The largest genera are *Hoplopleura* with 37 species, *Polyplax* with 28, *Linognathus* with 23 (another undescribed one is at hand), *Enderleinellus* with 19, *Neohaematopinus* with 17 and *Haematopinus* with 11. The number of monotypic genera—14—is rather large, but of these at least half will in all probability receive future additions. The others are probably genuinely monotypic, that is represent groups of which there remains but a single living species. Such are probably *Hybophthirus*, from the “aard vark”; *Haematopinoides*, from a North American mole; *Microphthirus*, from the American flying squirrels and *Lepidophthirus* from the southern sea elephant. The three species of *Microthoracius*, from Camelidae, almost certainly represent the entire complement of this genus and there can not be many more than the three known species of *Fahrenholzia*, from the little rodent family Heteromyidae. So with certain other genera; we may confidently assume that few, or even no, more species will be found.

The problems of distribution are among the most interesting of those associated with the group. Within certain limits it is evident that the distribution of the lice is correlated with the

phylogeny of the hosts. The genus *Polyplax*, for example, is characteristically present on rodents of the family Muridae; *Hoplopleura* ranges over several rodent families; *Enderleinellus* is strictly sciurid-infesting; *Linognathus*, with one curious exception, occurs only on Bovidae; *Pedicinus* belongs exclusively to the cynomorph monkeys. But there are a number of strange exceptions, some of which are susceptible to reasonable explanation, others of which are not.

How far the parallelism between the parasite and host groups extends and to what extent the classification of one group may legitimately be used to throw light on the phylogeny of the other can not finally be determined until the Anoplura are practically completely known and anything which may be said at the present time must be subject to reservations and future revision. For example. In the writer's opinion the lice of the lemuroids as far as known bear out Wood-Jones' contention that the lemurs are not Primates but are related to the tree shrews, but it must be confessed that our knowledge of the lice of the lemuroids is still too fragmentary to permit very definite decisions. It is entirely possible that further collecting will completely destroy the value of their evidence.

The lice of man and the monkeys present some of the most interesting and at the same time puzzling problems to be found in the study of the Order. The evidence is by no means all in, and probably will not be for many years to come, for to be satisfactory it must eventually include a considerable body of laborious and difficult experimentation together with cytological studies on chromosome numbers as well. But as it stands at present some things seem definitely indicated.

The lice of the cynomorph monkeys constitute in the writer's opinion but a single genus, *Pedicinus*, the other two genera which have been named being in his view uncalled for. This genus contains not more than 8 known species, for which some 15 names have been employed. The genus should be retained in the same family with *Pediculus*, but the two are well separated. This is consistent with mammalogists' views as to the relationships of the Cynomorpha.

One's attitude toward the problems within the genus *Pediculus* will be conditioned largely by his basic concept of the meaning of the word "species." As the writer has pointed out elsewhere, there are two different kinds of species. There are those groups of organisms which a systematist working from preserved material labels by the same name and there is a biological concept and the two may not coincide. This condition is well exemplified in this genus. In the writer's view most of the numerous "species" and "subspecies" which have been named in the genus *Pediculus* are purely "specimen species." For example, one so-called species, *P. lobatus* Fahrenholz, as originally described and as re-described by a later author, is based solely upon shrunken specimens, which when properly treated and expanded become another "species." Other species and subspecies have been described with a complete disregard of the possibilities of individual variation—it can not well be determined from a single specimen—and are of but little more significance.

The biological concept of the species, to which the writer has finally come, is this. "A species is a group of individuals forming a genetically linked or interwoven complex." With this definition in mind; with a background of the extensive experimental work on the lice of man which was carried out by Nuttall and his colleagues; and from the examination of a large range of material from different races of man and various species of monkeys and apes, this including various types and other authentic material, the writer has come to these general conclusions.

There are but three known, valid, biological species of the genus *Pediculus*, these being *P. humanus* Linnaeus, of man; *P. schüffi* Fahrenholz, of the chimpanzee; and a third, for which the name *P. mjobergi* Ferris appears to be applicable, from New World monkeys. The supposed races, or subspecies of *P. humanus* from various races of man, have no existence in fact, with the possible exception of a form which may be characteristic of African negroes.

It is evident that the distribution of the species of *Pediculus*,

as our knowledge stands at the moment, presents some strange aspects. The occurrence of one of these species upon New World monkeys, which are conceded by all mammalogists to be but remotely related to any of the other Primates is unreasonable from any point of view. But this is merely one of several such problems which may eventually be elucidated when our knowledge has been properly extended.

As to the ecology of the sucking lice, we at present know but very little. The work which has been done upon *Pediculus humanus* includes practically all that has been done. Here are still fields that are virtually unexplored.

The Copperhead as a Destroyer of Cicadas.

It is generally known that the copperhead, *Agkistrodon mokasen* Beauvois, ordinarily subsists upon a diet of frogs, mice, and other small mammals, varied by an occasional bird; consequently, when one of these snakes forsakes the realm of vertebrata for food, the event is worthy of note.

Examination of the stomach contents of an example of this species, collected at Bloomsdale, Missouri, on August 9, 1931, disclosed a large cicada (identified as *Tibicen chloromera* Wlk. by Mr. William T. Davis) in a partly digested state. Of course it frequently happens that insects found in snake stomachs had been eaten previously by vertebrate victims of the snakes rather than by the snakes themselves. In such cases the bones of the vertebrates are usually present with the insect remains, but in the present instance no other animal matter was found, so it is probable that the snake actually seized the cicada for food.

This observation agrees with those of Surface,* who examined the contents of the stomachs of more than forty copperheads and found cicadas (*Magicicada septendecim* Linn.) in six of them.

All six had gorged themselves upon these insects, which constituted eight per cent of the total amount of food consumed by the snakes he examined. This snake appears, therefore, to be a regular destroyer of cicadas, although it still remains to be determined whether copperheads habitually seek them for food or feed upon them only when there is a lack of sufficient vertebrate prey.—DOROTHY A. BOYER and ALBERT A. HEINZE, Kimmswick, Missouri.

* Surface, H. A. Zool. Bull. Penna. Dept. Agr., Vol. IV, p. 189, 1906, and Vol. V, p. 74, 1907.